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Lumos Digital Assets' Review of the Upcoming Ethereum Shanghai/ Capella Upgrade

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Introduction

The Shanghai/Capella upgrade is a hard fork occurring to both the execution layer (Shanghai) and the consensus layer (Capella) on the Ethereum network. The upgrade focuses on finalizing The Merge by enabling validators to withdraw their staked ether from the Consensus Layer.

The fork is expected to occur on April 12, 2023, as the recent rounds of testing appear to have been successful. The upgrade is still considered high-risk because it deals with processing money movement, but it is thought to have low technical risk due to the simplicity of the changes occurring to Ethereum itself.

The core responsibilities of validators (node operators) remain mostly unchanged with this upgrade. Validators' assigned duties include proposing new blocks to be added to the blockchain as well as voting on the blocks to be included. The rewards for these actions are correlated with the staked balance up to the "effective cap" of 32 ether. This means that any validator with a staked balance of 32 ether or more are all eligible for the same potential rewards.

Penalties for not performing these duties result in a reduction in their staked balance, while more serious offenses are met with slashing events, which reduce their staked balance and forcefully remove nodes that have misbehaved from the validator set entirely. This risk reward profile of Ethereum staking aligns incentives so that each validator is most interested in maintaining the health and stability of the network. Node operators have the option of exiting the validator set voluntarily as well, giving direct ether liquidity to all validators after Shanghai/Capella. In this piece we will briefly cover the highlights of the upgrade and explore the potential impacts to the network in greater detail.

Withdrawals Overview:

- Partial withdrawals occur automatically for any validator above 32 ether as any balance above this "effective cap" does not increase potential rewards. The average validator balance as of March 28, 2023 is roughly 34 ether.[1]
- Full withdrawals for slashed validators process ~36 days after slashing offense.
- Full withdrawals for un-slashed validators process ~1-2 days after voluntary exit varying on queue times.
- Redemptions of liquid staking tokens for native ether through staking providers is NOT part of this upgrade and will have timeframes that differ from the Ethereum protocol.
- Validator withdrawals do not cost gas and therefore don't impact fees. [2]

1 https://www.rated.network/overview?network=mainnet&timeWindow=1d&rewardsMetric=average

2 https://notes.ethereum.org/@launchpad/withdrawals-faq

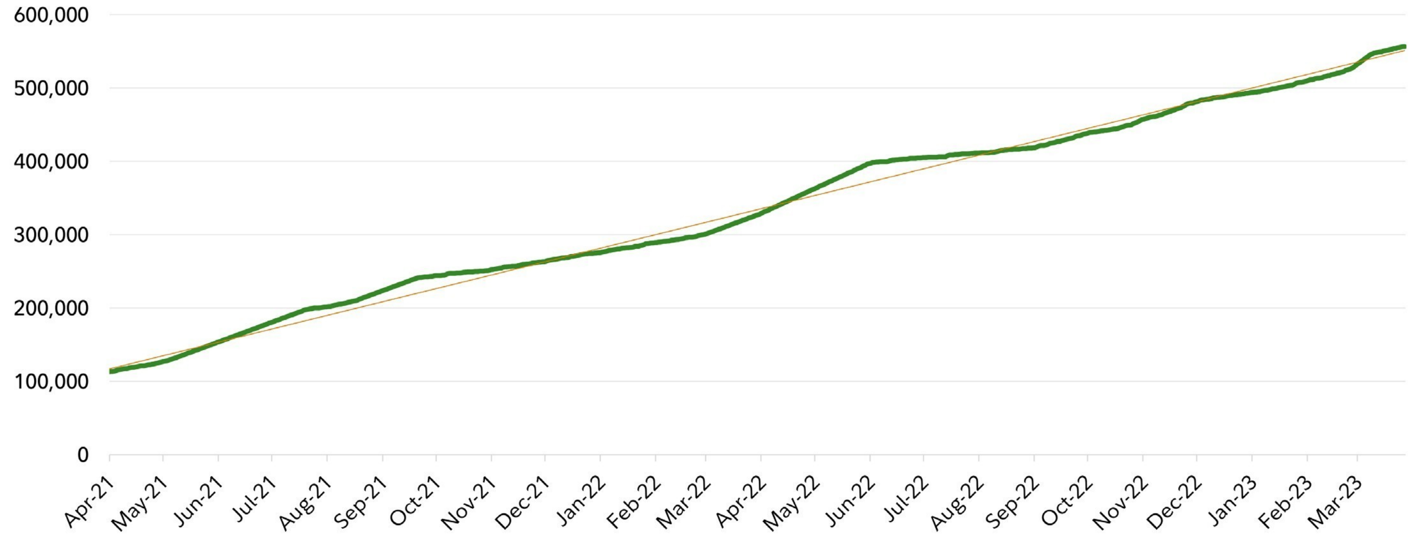
All Signs Point to More Staked Ether

The amount of staked tokens in a proof-of-stake network like Ethereum is a closely watched metric because the more ether at stake, the healthier and more secure the network is likely to be.

Although some believe allowing withdrawals will decrease the amount of staked ether, we think the amount could instead rise due to the following:

1. Validator entries haven't shown any signs of slowing since Beacon Chain genesis.

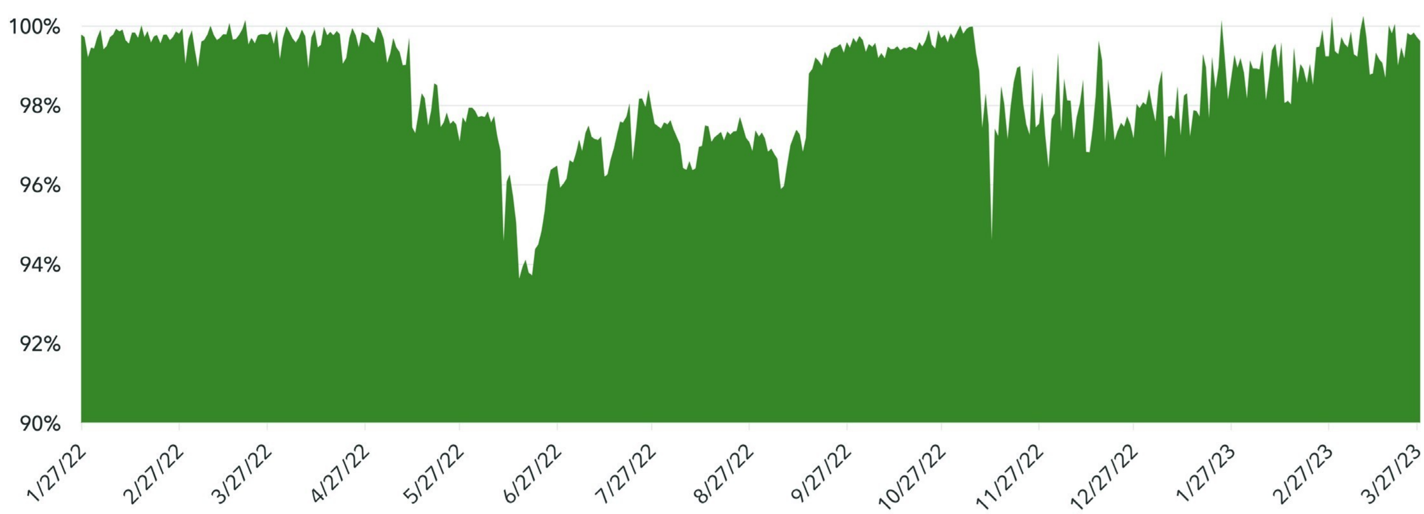
Active Validator Count and Trend Line



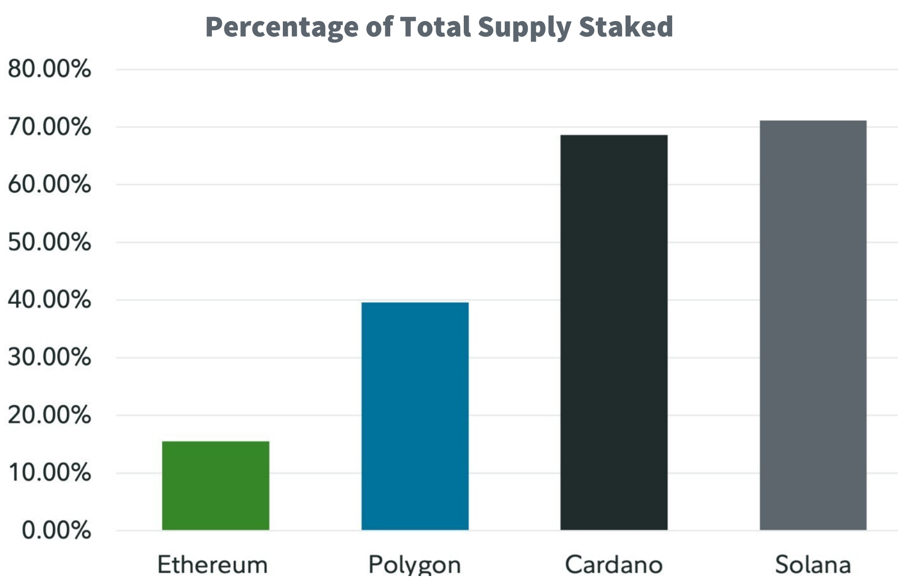
Source: Coin Metrics, 03/27/2023.

2. Confidence that liquid staking tokens will be redeemable at parity for ether, measured by the price discount between the token and ether, has remained relatively stable.

Lido Staked ETH Discount/Premium



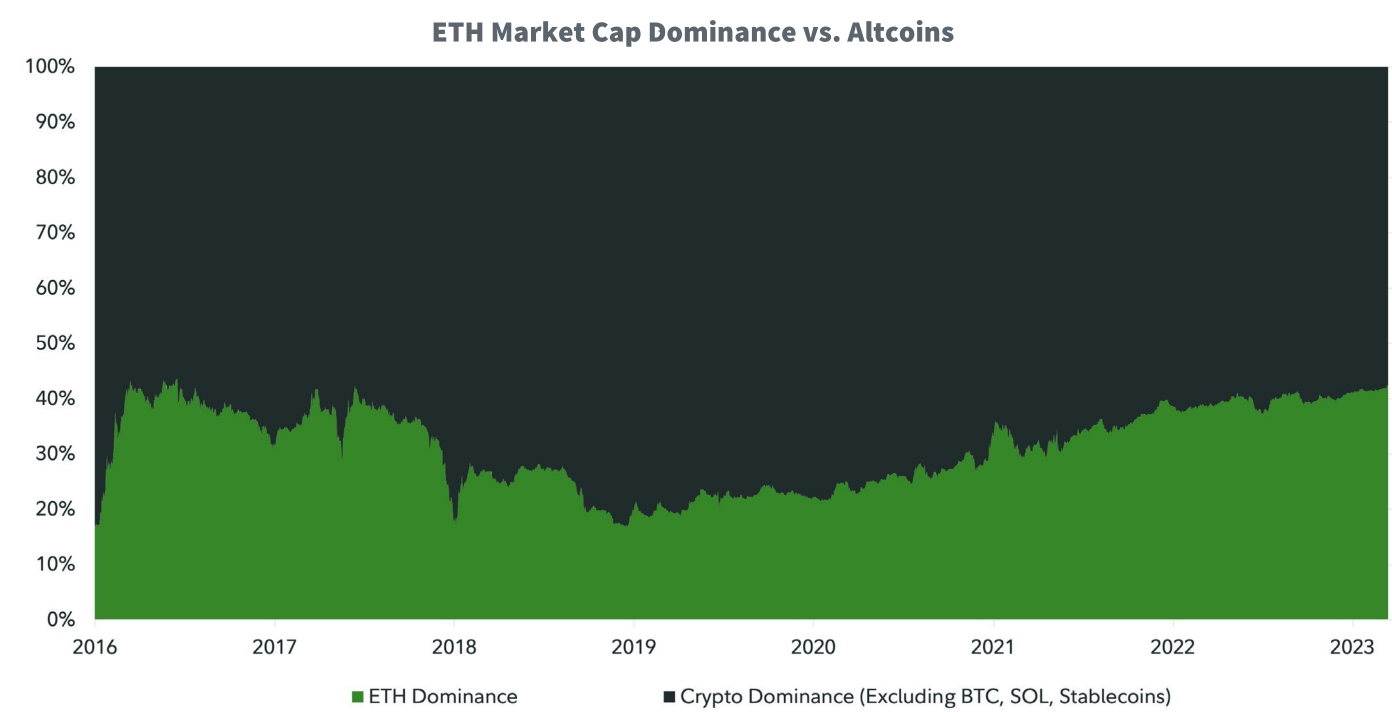
Source: Glassnode, 03/28/2023.



Source: Stakingrewards, 03/28/2023.

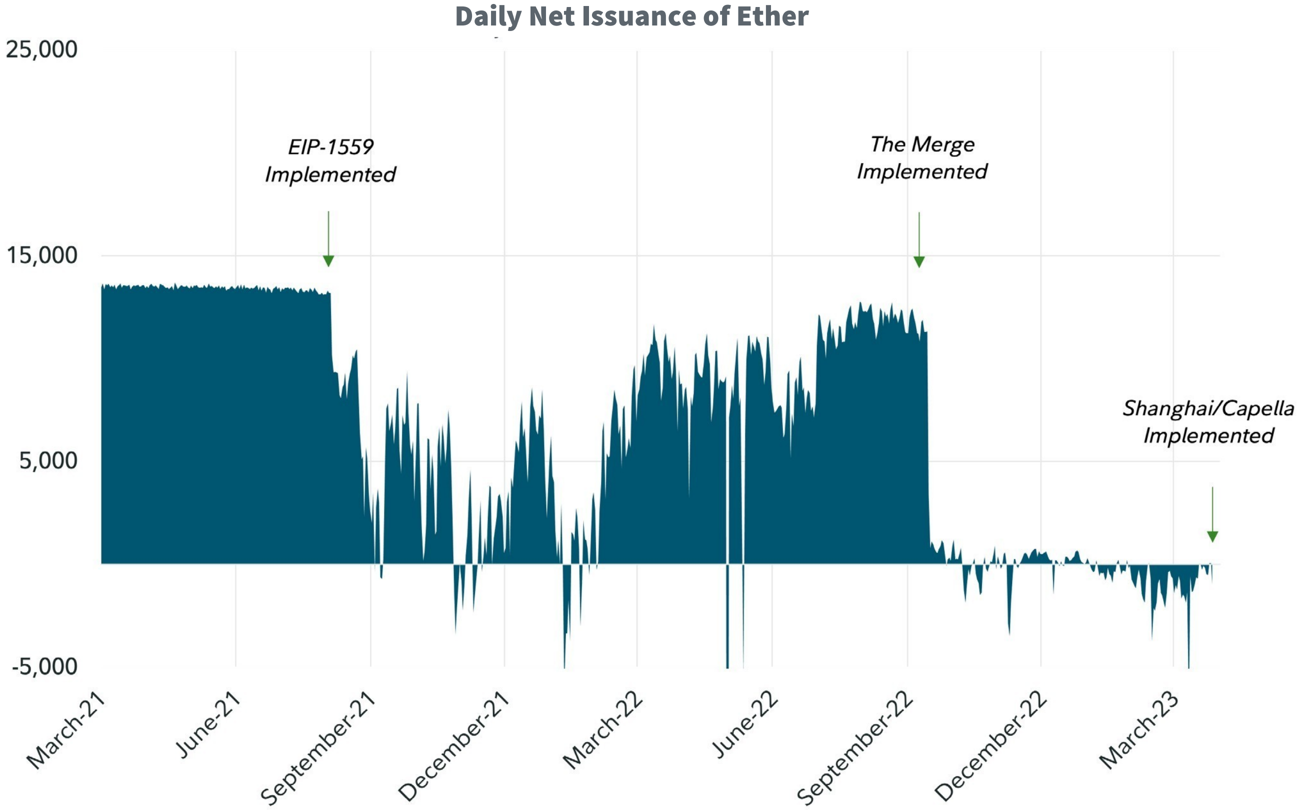
3. The percentage of total supply staked is low compared to other proof of stake networks. Therefore, once withdrawal capabilities are available, we think the staking percentage difference between other networks could narrow.

4. Ethereum is considered the dominant ecosystem when it comes to programmable blockchains due to its first mover advantage, the network's age, and large network effects. This can be seen in its market share compared to alternative and competing blockchains. Due to its potential staying power, some may consider participating in Ethereum staking to be lower risk than with other competing blockchains in the ecosystem.



Source: Glassnode, 03/27/2023.

5. Ethereum is providing real income considering current burn and issuance rates, but this may change over time.



Source: Coin Metrics, 03/27/2023.

The above observations provide a foundation for why Lumos Digital Assets' Research believes the increase in staked ether will continue. However, the timeline and future stability of these trends remain unclear. Many investors may decide to wait months after Shanghai/Capella's implementation for sufficient confidence that technical risks are low enough to begin staking. Furthermore, the unclear regulatory environment may prevent some from participating at all. While there are still many hurdles to overcome, we maintain that the coming upgrade could accelerate the adoption of staked ether.

Why Liquid Staking Tokens Will Remain Popular Despite Direct Ether Liquidity

Shanghai gives solo stakers direct liquidity, which could improve the popularity of solo home staking. However, there are economic factors that may make solo staking more of an altruistic endeavor than an economically rational one from the perspective of node operators. We outline some of the potential advantages and disadvantages of solo staking versus utilizing a staking service below:

Why node operators will be driven to providing staking services through staking pools instead of solo home staking:

- Additional income from fees
- Lower barrier to entry (do not need 32 ETH)

Why node operators may decide to solo home stake:

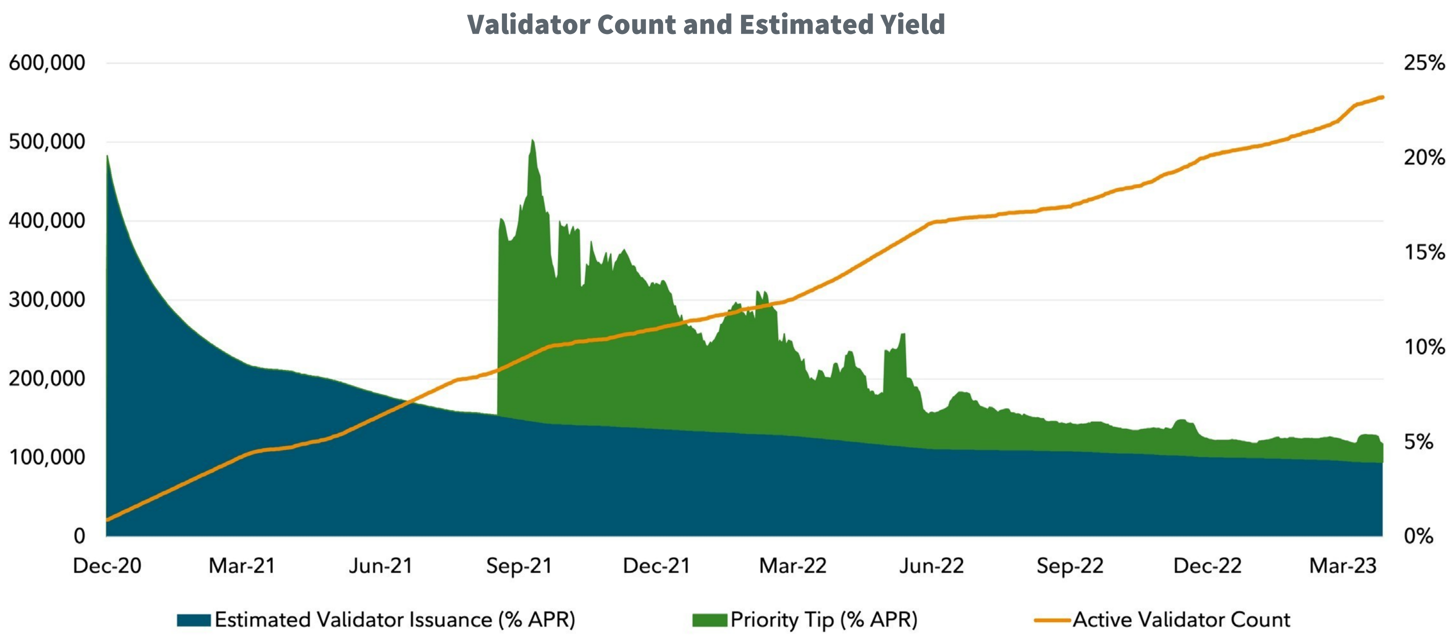
- Additional technical risk from middleware (staking services) may not warrant the additional income
- Should staking fees compress, this lessens the opportunity cost associated with home staking

Ultimately, market forces will be the determining factor for how the staking landscape evolves.

The reason that node operators can earn additional fees for their services is because there is a high proportion of ether holders that do not have 32 ETH, nor the technical knowledge to run validating hardware. These are relatively inelastic factors that will continue to drive demand for liquid staking tokens from the perspective of ether holders and are part of the reason why Lido is now holding 31% of all staked ether.[3]

Doesn't More Stake Mean More Inflation? Yes, but…

Ethereum doesn't have a fixed supply schedule; however, the parameters set by the protocol impose a cap. This upper bound for inflation is often overlooked and supports the narrative that income from Ethereum staking is relatively sustainable.



Source: Coin Metrics, 03/27/2023.

As we can see from the above, as more ether is staked, total issuance goes up, and individual staking rewards go down. At 15% of supply staked, APRs for validators have compressed down to roughly 5%. This dynamic may act as an incentive pendulum depending on ether sentiment. The more bullish ether holders are, the more likely they are to accept the lowest potential staking income and vice versa.

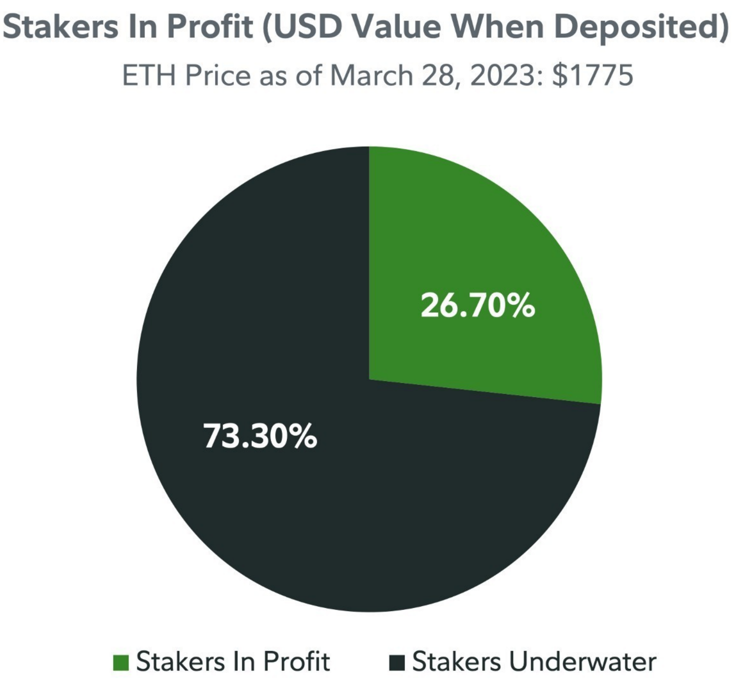
3 https://dune.com/hildobby/eth2-staking

Will The Unlocking of Staked Tokens Cause More Selling Pressure?

With events concerning a large unlocking of tokens, a general assumption is that many will be immediately sold on the open market. We explore the contributing factors to this theory and explain why the market impact is more nuanced in this scenario.

Firstly, while validators still have operating expenses, they are just a fraction of what they were under the proof of work system.

The chart below shows the realized price of staked ether, which is the average price at which ether has been staked over time. The idea here is that although the beacon chain has been in existence since December 1st, 2020, most staked ether positions are in a position of loss overall, which may reduce the selling associated with taking profits off the table.



Source: Dune Analytics @hildobby

In a similar vein, it's important to highlight that 33% of staked ether is already liquid through liquid staking tokens. [4] These token holders have been able to exit their position before the upcoming upgrade.

Additionally, with the amount of ether held by staking service providers, these entities will likely impose their own timeframes at which their ether is unlocked. For example, Lido has tentatively scheduled their redemption mechanism to be pushed to Mainnet by mid-May and the timing of other protocol redemptions likely will vary as well. [5]

This means that instead of all ether being unlocked within the week after the upgrade, it will likely be more of a phased unlocking based on how much ether is held at each provider and when each provider implements the withdrawal mechanism on Mainnet.

	Amount of ETH [6]	Percentage of Total Supply
Partial Withdrawals	1,113,640	0.92%
Full Withdrawals (Slashed and Voluntary Exits)	43,456	0.04%

In summary, while ~1% of the total ether supply is being withdrawn over about a month's time, the popularity of staking makes it likely that much of the partial withdrawals will be re-staked. Additionally, the amount of

4 https://dune.com/hildobby/eth2-staking
5 https://twitter.com/lidofinance/status/1635739571227951117?s=46&t=QvwxMUVg1-SANTfnvY7Rcw
6 Glassnode 3/27

time between the various protocol's unlocking mechanisms spreads out the market impact over a month instead of a day or week. Lastly, the realized price for staked ether should ease fears of large-scale profit-taking. All of these factors will likely mute the visible impact on ether price we see over the month of April.

Conclusion

In general, more staked ether is good for security, with some variance depending on the type of staking setup.

Liquid staking services will likely stay in high demand for investors and node operators alike. Although 1% of ether supply is scheduled to be withdrawn in April/May, the selling pressure will be muted due to the likelihood of partial withdrawals being re-staked as well as the length of time the withdrawals will take.

Overall, if this upgrade is successful, it will likely increase investor confidence in ether as a sustainable income-generating asset. Although we note this confidence may be overshadowed by the macro-economic appetite for risk assets as well as the potential for yield via traditional investment products in the short-to-medium term.

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